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Editorial Open Access

Lifestyle Intervention and Weight Reduction for Obese Elderly as to Flailty and Sarcopenia

Hiroshi Bando*

Medical Research, Tokushima University, Tokushima, Japan

***Corresponding author**: Hiroshi Bando, Medical Research, Tokushima University, Nakashowa 1-61, Tokushima 770-0943, Japan, Tel: +81-90-3187-2485; Fax: +81-88-603-1030; E-mail: pianomed@bronze.ocn.ne.jp

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Editorial

In many countries, one of the medical serious problem has been increasing metabolic syndrome (Met-S) such as obesity and type 2 diabetes mellitus (T2DM). Consequently, several kinds of nutritional therapies have been continued including Calorie Restriction (CR), low carbohydrate diet (LCD) and other diets. Weight reduction has been effective for treatment of these patients, and various trials have been reported so far concerning diet, exercise, weight reduction and intensive lifestyle intervention (ILI).

Concerning life style intervention trial, one of the well-known study is Look AHEAD (Action for Health in Diabetes). It has been noted randomized controlled trial (RCT) which investigated a weight loss intervention on CVD morbidity and mortality in people with T2DM [1]. As a result, individuals in ILI group had better physical function scores and faster walk speeds compared to those randomized to diabetes support and education (DSE) group [2]. For 8-year weight losses achieved with ILI, it showed clinically meaningful weight loss (≥ 5%) in 50% of patients with T2DM and can be used to manage other obesity-related co-morbid conditions [3]. Furthermore, in the light of reducing cardiovascular mortality, C-reactive protein (CRP) changes in 1,431 participants were investigated about on or off statin treatment, resulting decreased C-reactive protein (CRP) and weight [4].

Regarding lifestyle intervention, other studies are found. In order to study sedentary time (ST) and non-exercise physical activity (NEPA), a 12-week exercise training and/or lifestyle intervention was performed, in which about half 75 participants had effects [5]. The Health Track study has been a 1 year RCT for a novel interdisciplinary lifestyle intervention [6]. They studied 377 participants for weight, lipids, glucose, blood pressure, diet, activity and psychological factors. As to Body Mass Index (BMI), median [25%-75%] values were 32 [29-35] at the baseline [6]. There has been RCT study on 640 subjects with coronary heart disease (CHD) [7]. They made lifestyle intervention in two groups, with successful changes in six months for increasing physical activity, improving the hypertension control, and decreasing lipid profile disorders, obesity, and tobacco use in the study group [7].

As mentioned above concerning weight loss, lots of factors have been involved such as dieting type, exercise, life and economic status. These integration will induce the results and circumstances which are different depending on each person [8]. As for nutritional therapy, there are so many kinds and classification. Out of these, rather standard classification has 9 categories, which are control diet, LCD, Low-glycemic index/load diet, high-protein diet, Mediterranean diet, vegetarian diet, low-fat diet, DASH-diet and Paleo diet [9]. These 9 kinds of diet from 56 trials with 4937 patients with T2DM, were investigated [10]. The results showed that the most effective 3 diets were LCD, Mediterranean and Palaeolithic for reducing HbA1c, and Mediterranean, Palaeolithic and Vegetarian for reducing fasting glucose [10]. Furthermore, LCD were more effective in HbA1c and body weight reduction in the short-term compared to other diets, whereas no superiority was observed in the long-term [11,12].

Authors have continued treatment and research for LCD for years, and investigated 2184 patients for weight reduction rate [13]. Obtained results were as follows: more than 10% were found in 597 cases (27.3%), 5.0–9.9% in 701 cases (32.1%) and 2.5–4.9% in 442 cases (20.2%). Weight reduction more than 5.0 % was found in 59.4%. It seems to be satisfactory, suggesting that actual continuation of LCD would be effective and useful.

In recent years, metabolic syndrome and locomotive syndrome have become medical and social problems, in which the both have important relationship each other. Although weight reduction is necessary for Met-S, muscle mass and bone mineral content also decreased, and there has been concern about sarcopenia with decreased muscle mass/strength and bone mass. In addition to weight reduction by diet therapy, exercise therapy (especially mixed exercise + resistance exercise) would be effective in order to improve at least physical functions such as living ability, aerobic exercise ability and muscular strength [14].

As described above, the significance and effect of diet + exercise therapy were proved [14]. However, as a negative result, a decrease in lean mass and a decrease in bone mineral density were found in all groups. Therefore, we should seek ways to improve physical function such as maximum muscular strength while increasing muscle mass. There was a previous report in non-obese super elderly, in which exercise intervention is effective for improve muscle mass and strength with increasing energy intake [15]. In another trial for intervention trial for elderly people with obesity, a mixed exercise intervention of aerobic exercise + resistance exercise was carried out without trying to lose weight by diet therapy [16]. As a result, the body does not lose weight, but the body function improves and the fat free mass increases [16].

From the above, increased energy intake + mixed exercise intervention may be important for prevention of sarcopenia in non-obese older adults. On contrast, it is presumed that in elderly people with obesity, combined methods with exercise mixed motor intervention plus increase in protein intake plus ingested energy. Regarding the calorie intake, "Japanese meal intake standard 2015" would be helpful for the aged people more than 70 years old, in which 2,200 kcal is standard for men and 1,750 kcal is for women.

In this study, muscle mass decreased with 1.0 g/day of protein intake per kg of body weight. Based on the dietary intake standards of Japan, the recommended amount of protein in the elderly is 1.06 g/kg / day, which is set higher than 0.9 g/kg day for young people, which seems to

be a reasonable standard. Regarding protein intake standards from the PROT-AGE group, 1.2 g/kg/day is recommended for high-activity healthy elderly people and 1.2-1.5 g/kg/day for elderly people with chronic illness. For the elderly people, the speculation would be indicated if the estimated glomerular filtration rate (eGFR) is at least 30 mL/min/1.73 m^2 [17].

On the other hand, there is an observational study of a woman whose eGFR is 80 mL/min/1.73m^2 or less [18] as a reference paper of the reverse argument. Among them, the decline rate of eGFR was the fastest in the group with protein ingestion of 1.3 g/kg/day or more (the fifth quintile). As described above, various problems of sarcopenia will be examined in the future as to various factors such as renal function, sex difference, protein intake, daily activity and national difference and so on.

There have been important problems concerning disuse of skeletal muscle and undernutrition, which cause frailty and sarcopenia [15]. There has been strong evidence that excessive adiposity leads to frailty by decreasing the ability to perform physical activities and increasing metabolic instability. Consequently, it is important to recognize the impact of being obese on physical frailty in older adults [19]. High-intensity resistance exercise training has been an effective and feasible means of counteracting muscle weakness and physical frailty in very elderly people [15]. In contrast, multi-nutrient supplementation without concomitant exercise does not reduce muscle weakness or physical frailty. For frail obese older adults, long-term maintenance of clinically important weight loss is possible [20].

Further study for mechanisms and behaviors underlying maintenance of weight loss and physical function would be necessary [20]. For 1 year exercise and lifestyle therapy program, there were changes in thigh muscle volume indicating hip bone mineral density (BMD) changes in obese older patients [21]. The effect of exercise in attenuating thigh muscle loss when added to diet may in part account for the reduction in weight loss-induced bone loss in the diet–exercise group. In obese elderly adults, several evidence-based data to guide treatment are reported [19,22,23]. They showed that weight loss plus a combination of aerobic and resistance exercise improved physical function and reduced frailty more than weight loss plus aerobic exercise or weight loss plus resistance exercise.

In summary, for those with obesity and Met-S in the world, weight reduction has been necessary with appropriate diet and exercise. It is desirable to carefully treat them while keeping their muscle mass and muscular strength so as to avoid flails and sarcopenia.

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